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FOREST SURVEY RELEASE NO. 3

DECEMBER 1, 1939

FOREST RESOURCES OF THE
SOUTHERN COASTAL PLAIN OF SOUTH CAROLINA

A progress report

by

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Appalachian Forest Experiment Station
R. E. McArdle, Director
Asheville, N. C.

FOREWORD

The field work and computations for this report were done under the direction of the Forest Survey staff of the Southern Forest Experiment Station, New Orleans, Louisiana. J. W. Cruikshank supervised the field work and P. R. Wheeler was in charge of the computations. A. R. Spillers assembled the data and drafted the original manuscript. Additions and revisions have been made by the Survey Staff of the Appalachian Forest Experiment Station.

Information covering several phases of the forest situation in this unit has been issued by the Southern Forest Experiment Station in the following advance releases, which may be obtained by writing the Director, Southern Forest Experiment Station, New Orleans, Louisiana:

Forest Survey Releases

- No. 10 - Advance Information on the Supply of Pulpwood in Survey Unit No. 1. South Carolina.
- No. 14 - The Quantity and Status of Naval-Stores Timber in Survey Unit No. 1. South Carolina.
- No. 17 - Statistics on Gum Naval Stores Production.
- No. 20 - Longleaf Pine Stumpwood Supply in Four Southeastern Survey Units.
- No. 21 - Pole and Pile Timber in Four Southeastern Survey Units.
- No. 25 - Sawmills in the Lower South.
- No. 29 - Volumes on Average Acres in the Principal Units of the Naval-Stores Region.

PREFACE

Through the McSweeney-McNary Act of 1928, Congress authorized the Secretary of Agriculture to conduct a comprehensive survey of the forest resources of the United States. The Forest Survey was organized by the Forest Service to carry out the provisions of the Act, and each of the 12 Regional Experiment Stations was made responsible for the work in its territory. In the Middle Atlantic States the Forest Survey is an activity of the Appalachian Forest Experiment Station, Asheville, North Carolina.

The work of the Survey is divided into 5 major phases:

1. Inventory. Determination of the extent, location, and condition of forest lands, and the quantity, species, and quality of the timber on these lands.
2. Growth. Determination of the current rate of timber growth.
3. Drain. Determination of the amount of industrial and domestic wood use, and the total loss resulting from fire, insects, disease, suppression, and other causes.
4. Requirements. Determination of the current and probable future requirements for forest products by all classes of consumers.
5. Policies and plans. Analysis of the relation of these findings to one another and to other economic factors as a basis for public and private policies and plans of forest land use and management.

This progress report presents preliminary information on the first three of these phases for the Southern Coastal Plain of South Carolina, one of the 3 units into which the state was divided. Similar releases have been published for the other units, the Northern Coastal Plain, and the Piedmont Region, and may be had upon request. A final report for the state is being prepared for publication.

Information on the physical forest resources was obtained by a field survey made in the summer of 1934. A total of 6,400 sample plots were established at intervals of one-eighth of a mile on compass lines 10 miles apart, extending across the unit from east to west. The statistical sample obtained from these plot records forms the basis for all area and volume estimates in this report, except where other sources are directly credited. Owing to the method of sampling data, small tabular items have the greater probability of error and should be considered as indicating relative magnitude rather than actual values.

Data on consumption of forest products for industrial and domestic purposes were obtained by canvassing all primary manufacturing plants and a number of representative domestic consumers.

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FOREST RESOURCES OF THE SOUTHERN COASTAL PLAIN OF SOUTH CAROLINA

GENERAL DESCRIPTION

The Southern Coastal Plain Unit (Forest Survey Unit No. 1) consists of 12 counties in the southern part of the state (fig. 1) with a total land area of more than 5 million acres. From a forestry viewpoint it is distinguished from the other sections of the state by the presence of extensive areas of longleaf and slash pine which support an active naval stores industry. In this respect it resembles more closely the coastal regions of the deep South than the other coastal units in South and North Carolina.

The physical characteristics of the area are typical of the Southeastern Coastal Plain. Along the coast sandy beaches or treeless marshes intersected by meandering streams gradually merge into level flatwoods which form a narrow, irregular belt extending across the entire unit from north to south. Farther inland elevations gradually increase and the land surface becomes rolling. The maximum elevation of approximately 650 feet is reached in the rolling sand hills of Lexington and Aiken Counties which mark the junction of the coastal plain and piedmont regions. Drainage is southeasterly through the Santee, Savannah, Combahee, and Edisto rivers and their tributaries. Soil conditions, gradient, and ground cover are such that destructive erosion is not a serious problem in this area. Although sheet erosion is more or less prevalent on open land, particularly in the central and western sections, deep gullying is rare. The heavy silt load of the larger rivers comes principally from the fields and caving banks in the Piedmont Plateau.

Harbor facilities for handling both coastwise and transatlantic trade are available at Charleston and Savannah. The Intracoastal Waterway and the navigable channels of the Savannah, Combahee, Edisto, and Santee rivers are open to small power craft, barges, and rafts. The Southern, Atlantic Coast Line, Seaboard Air Line, Charleston and Western Carolina, and a number of smaller railroads, together with an excellent highway and county road system, provide overland routes of transportation.

The 1930 Census lists the population in the unit as 312,000; 60 percent living on farms, 32 percent in small communities, and only 8 percent in towns having a population over 2,500. There are no large cities in the unit, although Charleston and Columbia, South Carolina, and Savannah and Augusta, Georgia, are in adjoining counties and have a marked influence on the general economy of the area.

Approximately 70 percent of the working personnel in the area, according to the 1935 Census of Business was engaged in farming, and the remaining 30 percent was about equally divided between manufacturing and various types of business and merchandising. More than half of the employees engaged in manufacturing were located in Lexington and Aiken Counties where the textile industry had been developed extensively. Outside of these two

counties, the principal manufacturing activities are lumbering and production of naval stores. Because of the integration of farming with the manufacture of forest products, many farmers are dependent on forests, particularly on the part-time jobs supplied by the naval stores and lumber industries. The Census of Unemployment,^{1/} taken in 1937, listed a total of 30,929 individuals who were totally unemployed, partially employed, or working with some emergency relief organization. This group is 20 percent of the total for the entire state. Of the number listed in these three classifications, approximately one-half were farm residents.

The Forest Survey found that in 1934, 58 percent of the entire area was in forests,^{2/} 32 percent in cropland and pasture, 4 percent in abandoned cropland and the remaining 6 percent in treeless tidal marshes, towns, rights-of-way and other non-forest classifications (table 1).

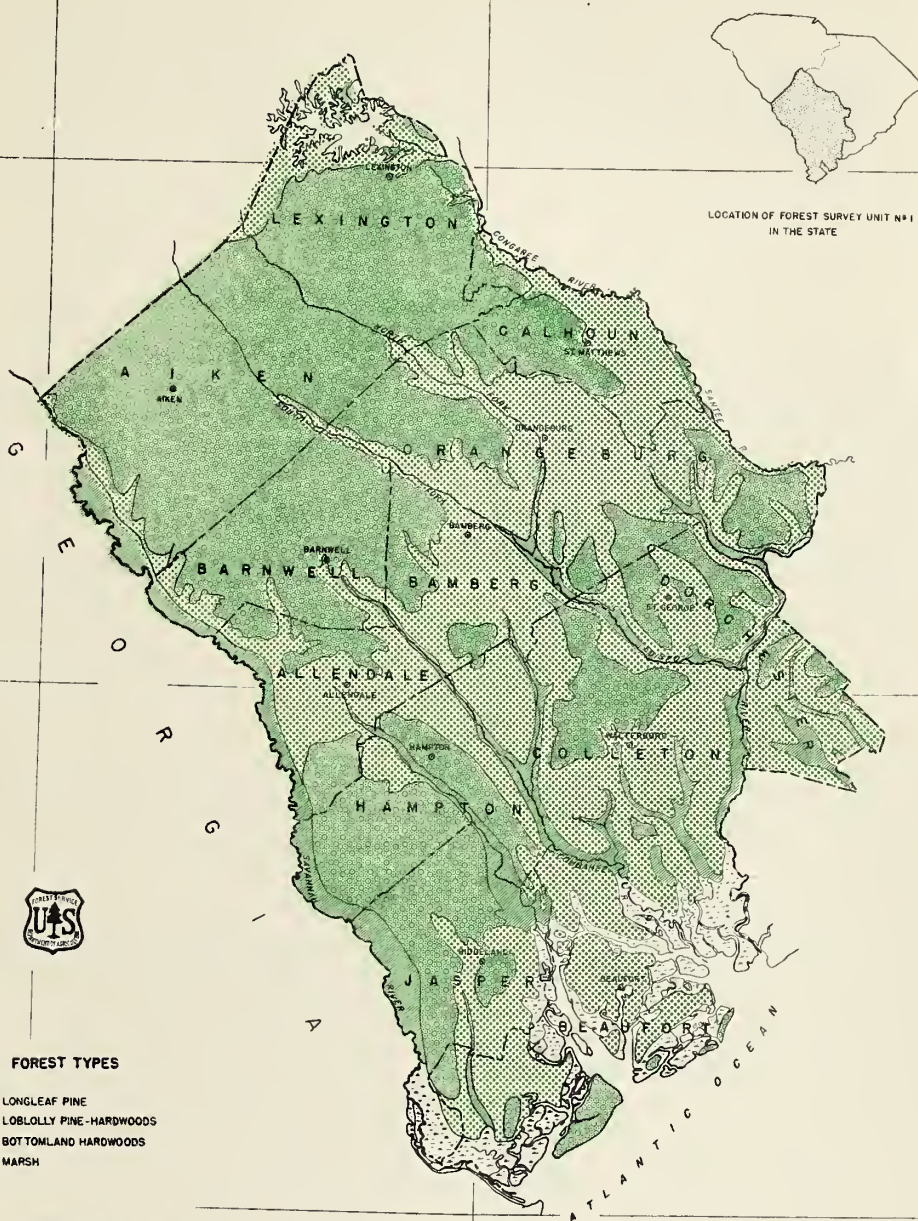
Table 1. - Total land area classified by major use^{1/}

Land use class	Area		Proportion of total area
	<u>Acres</u>		<u>Percent</u>
Forest	2,993,000		57.7
Non-forest:			
Agricultural:			
Cropland	1,645,100		31.7
Pasture	31,400		.6
Abandoned cropland	181,600		3.5
Marsh	212,200		4.1
Towns, rights-of-way, etc.	123,600		2.4
Total non-forest	2,193,900		42.3
Total	5,186,900		100.0

^{1/} Does not include 91,200 acres in the coastal islands of Beaufort County.

^{1/} Final report on Total and Partial Unemployment for South Carolina, John D. Biggers, Administrator, Washington, D. C., 1937.

^{2/} See Glossary for definition of terms.



MAJOR FOREST TYPES IN THE SOUTHERN COASTAL PLAIN OF SOUTH CAROLINA

FOREST SURVEY
APPALACHIAN FOREST EXPERIMENT STATION
1936

According to the 1935 Census of Agriculture, 56 percent of the area was in farms, the proportions by counties varying from 29 percent in Jasper County to 80 percent in Bamberg. Farm woodlots, including woodland pastures, occupy nearly $1\frac{1}{2}$ million acres, or about half of the forest land in the unit. Lumber and pulp companies own a number of large tracts of timber land estimated to aggregate more than 300,000 acres. Estates and game clubs also own or control extensive areas of forest land, chiefly in the coastal counties.

FOREST DESCRIPTION

The 3 million acres of forest land in this Survey unit exhibit a wide variety of physical characteristics. The flatwoods area, lying in a broad belt across the eastern counties, makes up about one-third of the forest area including some of the best pine stands in the state. Another third of the forest acreage lies in the swamps, bays, and river bottoms throughout the unit. The remaining third is in the rolling upland sections in the central and western parts of the unit, including the sandhills of Aiken and Lexington Counties.

Forest Types

For description and analysis, the several forest types recognized in the field have been combined into three type-groups, longleaf-slash pine, loblolly pine, and hardwood-cypress.

Longleaf and slash pine, with their associates, predominate on slightly less than a million acres or about one-third of the total forest area (table 2). Longleaf pine is the principal species, making up 55 percent of the cubic foot volume in the type-group. Slash pine comprises 18 percent and loblolly pine, the most common associate, accounts for 10 percent. The remaining volume consists principally of other pines, black gum, cypress, and oaks. Although the most extensive areas in the longleaf pine type-group are located in the sandhills region of Lexington, Aiken, and Barnwell Counties, the stands in these areas are generally poorly stocked with pine and have a dense understory of scrub oak which greatly handicaps the establishment of pine reproduction. The best stands of longleaf and slash pine occur in the flatwoods areas in the eastern counties.

The loblolly pine type-group, which includes small areas of shortleaf, pond, and spruce pine, occupies an aggregate area of 1,224,000 acres, approximately 41 percent of the total forest area. Loblolly pine is the predominant species, making up 55 percent of the total cubic foot volume in this type-group. The principal associated species, shortleaf and pond pines, red and black gum, together with smaller quantities of oak and other hardwoods, compose the remaining volume.

Table 2. - Productive forest area classified by forest condition and type group

Forest condition	Forest type group			Total	Proportion of total
	Longleaf-slash pine	Loblolly pine	Hardwood-cypress		
	- - - - - Acres - - - - -				Percent
Sawlog size:					
Old growth:					
Uncut	16,100	103,600	98,100	217,800	7.3
Partly cut	61,800	66,800	105,300	233,900	7.8
Total	77,900	170,400	203,400	451,700	15.1
Second growth:					
Uncut	327,100	524,100	255,500	1,106,700	37.0
Partly cut	29,700	159,900	37,800	227,400	7.6
Total	356,800	684,000	293,300	1,334,100	44.6
Total sawlog size	434,700	854,400	496,700	1,785,800	59.7
Under sawlog size:					
Second growth	461,500	293,300	241,000	995,800	33.2
Reproduction	53,800	73,100	67,600	194,500	6.5
Clear cut	8,900	3,200	4,800	16,900	.6
Total under sawlog size	524,200	369,600	313,400	1,207,200	40.3
Total all conditions	958,900	1,224,000	810,100	2,993,000	100.0
Percent of total	32.0	40.9	27.1	100.0	

The hardwood-cypress type-group predominates on 810,100 acres, 27 percent of the productive forest area. The most important and widespread type within this group is the bottomland and swamp hardwood association which occurs in the alluvial valleys and stream margins throughout the unit. Composed principally of black and red gum, oaks, and a number of minor commercial hardwoods, together with cypress and a scattering of loblolly pine, this group is the principal source of hardwood sawtimber in the unit.

In the deeper swamps of the large river bottoms and in the ponds and bays of the flatwoods small areas of cypress occur usually mixed with tupelo gum, black gum and occasionally slash pine. The remaining component of the hardwood type-group is made up of scattered stands of upland species, principally oaks, gums, hickory and other hardwoods, including the scrub oaks. As a dominant group, the upland hardwood association occupies only 4 percent of the total forest area.

The range of the important type groups is shown on the type map (fig. 1). No attempt is made to delineate either the non-forest land or the small areas of less prevalent types within the range of the dominant association.

Forest Conditions

Over the past three centuries, timber cutting, fire, turpentine, and abandonment of farm land have resulted in a wide variety of conditions with respect to age, size, and general utility value of the stands (table 2). In 1934, sawlog-size stands occupied more than 1-3/4 million acres, about 60 percent of the total forest area, and averaged 5,080 board feet per acre. Almost half of this acreage was dominated by loblolly pine and its associated species, and the remainder was about equally divided between the long-leaf-slash pine and hardwood type-groups. Approximately one-quarter of the acreage in sawtimber stands contained timber classified as old-growth, but over half of the old-growth stands were partly cut, indicating that selected species and the best quality trees had been removed. Nearly half of the old-growth stands was in the hardwood-cypress type. The average volume of all old-growth stands was 7,710 board feet per acre (International 1/4-inch rule).

Second-growth sawlog-size stands occurred on 45 percent of the forest area, principally in the pine type groups. Seventeen percent of the stands in this condition class had been partly cut. The average volume per acre for all second-growth sawlog stands was 4,190 board feet.

One of the most significant items in the whole forest condition classification is the large proportion of forest acreage in the second-growth under sawlog-size condition. At the time of the survey, one-third of all forest land was in this condition class and an additional area stocked with reproduction brought the total acreage of established young forests to nearly 40 percent of the forest area. Although only a comparatively small volume of sawtimber exists on these lands at present, they are important potential sources of lumber and other forest products. Since these stands are predominantly pine, they indicate to a large extent the general type of material that will be available for future utilization.

The small proportion of the forest area classified as clearcut, six-tenths of one percent, is an encouraging aspect of the forest situation in the unit, as it indicates that natural reforestation follows quickly after cutting and the problem of unstocked cut over areas is not serious.

As in most extensive forest areas where no planned system of forest management has been followed and where forest fires have been common, the trees in many stands are widely spaced and volumes per acre are characteristically low. This comparatively thin stocking, common throughout the southern forests, is apparent in nearly any comparison of actual yields of these areas with those of fully stocked stands. For the forests in this unit the degree of stocking may be judged by comparing the average cordwood volume per acre on the uncut pine areas with an arbitrary standard based on the best stocked 10 percent of the stands in that area weighted by site.

Average volume per acre,
uncut conditions

Age class	All pine types	Best 10 percent of pine types	Relation of volume on all pine types to volume on best 10 percent
<u>Years</u>	<u>Cords</u>	<u>Cords</u>	<u>Percent</u>
21-30	4.8	17.0	28
41-50	15.2	33.3	46
61-70	22.7	44.4	51
Weighted average all age classes	12.5	28.8	43

Although volumes per acre even larger than shown for the best 10 percent are possible under intensive management, the fact that these volumes exist on as much as 10 percent of the pine area in the uncut conditions, indicates that such densities are not unattainable objectives under fire protection and reasonable management.

TIMBER ESTIMATES

Sawtimber Volume

The total board foot volume in merchantable, sawlog-size trees (softwoods 9 inches, hardwoods 13 inches d.b.h. or larger) is listed in table 3. The volumes are net log scale, deduction having been made for material that under present practice would be left in the woods because of rot, fire scar, crook, liminess and other defects, as well as for loss in sawing at the mill caused by sweep and interior defects.

Table 3. - Net board-foot volume classified by major species groups, by International $\frac{1}{4}$ -inch, Scribner, and Doyle log rules, 1934

Major species group	International $\frac{1}{4}$ -inch ^{1/}	Scribner	Doyle
----- Thousand board feet -----			
Pines:			
Longleaf	1,024,500	863,600	571,500
Slash	321,100	268,300	168,300
Loblolly	3,703,300	3,255,900	2,452,200
Others	714,400	618,500	414,500
Total pines	5,763,300	5,006,300	3,606,500
Hardwoods:			
Red gum	931,100	849,400	694,700
Black gum	723,900	618,600	485,500
Tupelo gum	269,800	234,800	189,100
Red oaks	458,500	424,200	359,500
White oaks	170,200	156,900	130,800
Ash	97,200	89,500	71,200
Others	504,700	454,400	353,100
Total hardwoods	3,155,400	2,827,800	2,283,900
Cypress	490,800	410,600	270,300
Total all species	9,409,500	8,244,700	6,160,700

^{1/}The scale by International $\frac{1}{4}$ -inch rule approximates green lumber tally.

Estimates are derived from three standard log rules -- Doyle, Scribner, and International $\frac{1}{4}$ -inch. The Doyle rule, although long used by the local lumber industry, is not a satisfactory measure of recoverable volume throughout the wide range of tree diameters included in this inventory. The Scribner rule, although more accurate, is likewise faulty as a basic rule for measuring volumes of trees of mixed sizes. The International $\frac{1}{4}$ -inch rule, used in subsequent volume tabulations in this report, measures approximately actual recoverable volume and for practical purposes is equivalent to green lumber tally. The total volume of sawtimber in the unit, by the Doyle rule, is only 65 percent and, by the Scribner rule, 88 percent of the volume according to the International $\frac{1}{4}$ -inch rule.

Table 4. - Net board-foot volume classified by species group and forest condition (International $\frac{1}{4}$ -inch rule), 1934

Species group	Forest condition					Total	Proportion of total
	Sawlog size				Under sawlog size $\frac{1}{4}$		
	Old growth		Second growth				
	Uncut	Partly cut	Uncut	Partly cut			
- - - - - <u>Thousand board feet</u> - - - - - <u>Percent</u>							
Pines:							
Longleaf and slash	102,000	246,600	817,500	61,700	117,800	1,345,600	14.3
Loblolly	967,900	228,700	2,000,200	413,900	92,600	3,703,300	39.3
Others	171,700	63,000	406,800	44,100	28,800	714,400	7.6
Total	1,241,600	538,300	3,224,500	519,700	239,200	5,763,300	61.2
Hardwoods:							
Red gum	327,500	118,800	408,800	61,500	14,500	931,100	9.9
Black gum	183,000	174,900	307,500	39,800	18,700	723,900	7.7
Tupelo gum	86,500	61,600	102,000	19,000	700	269,800	2.9
Red oaks	141,700	50,500	213,900	32,600	19,800	458,500	4.9
White oaks	71,700	17,300	69,500	7,300	4,400	170,200	1.8
Others	175,300	102,500	247,700	54,800	21,600	601,900	6.4
Total	985,700	525,600	1,349,400	215,000	79,700	3,155,400	33.6
Cypress	119,800	72,000	240,200	39,700	19,100	490,800	5.2
Total all species	2,347,100	1,135,900	4,814,100	774,400	338,000	9,409,500	100.0
Percent of total	24.9	12.1	51.2	8.2	3.6	100.0	

¹/Includes 14.5 million board feet on the areas classified as reproduction and clearcut.

Pine species make up 61 percent of the total sawtimber volume with loblolly pine alone accounting for nearly 40 percent of the total. Hardwood species, largely red and black gum, comprise an additional 34 percent, and the remaining 5 percent is cypress (table 4).

Nearly 31 percent of the pine volume, 48 percent of the hardwood, and 39 percent of the cypress occur in old-growth stands. Although the old-growth timber is generally the best in the unit, not all of it has the quality usually associated with original stands. Nearly one-third of it is on partly cut areas indicating that selected trees have been removed. In other cases these stands are overmature and defective. The volume in the old-growth condition classes also includes the volume of second-growth trees occurring in the old-growth stands.

Second-growth stands, including the occasional sawtimber trees in the under sawlog-size conditions make up 63 percent of the total volume. These rapidly growing stands are particularly important as they will provide the major part of the future lumber production.

The board foot volumes discussed in the previous paragraphs are aggregate estimates for the entire survey unit without regard to location, stand density or other factors which might affect their status with respect to marketing. Probably no extensive timber area in the unit is totally inaccessible to the logging operator. Indeed, 93 percent of the forest area has already been logged over. The more important factors affecting operability of the sawtimber volumes are ownership, market requirements, stocking or stand density, and size, age and quality of the timber.

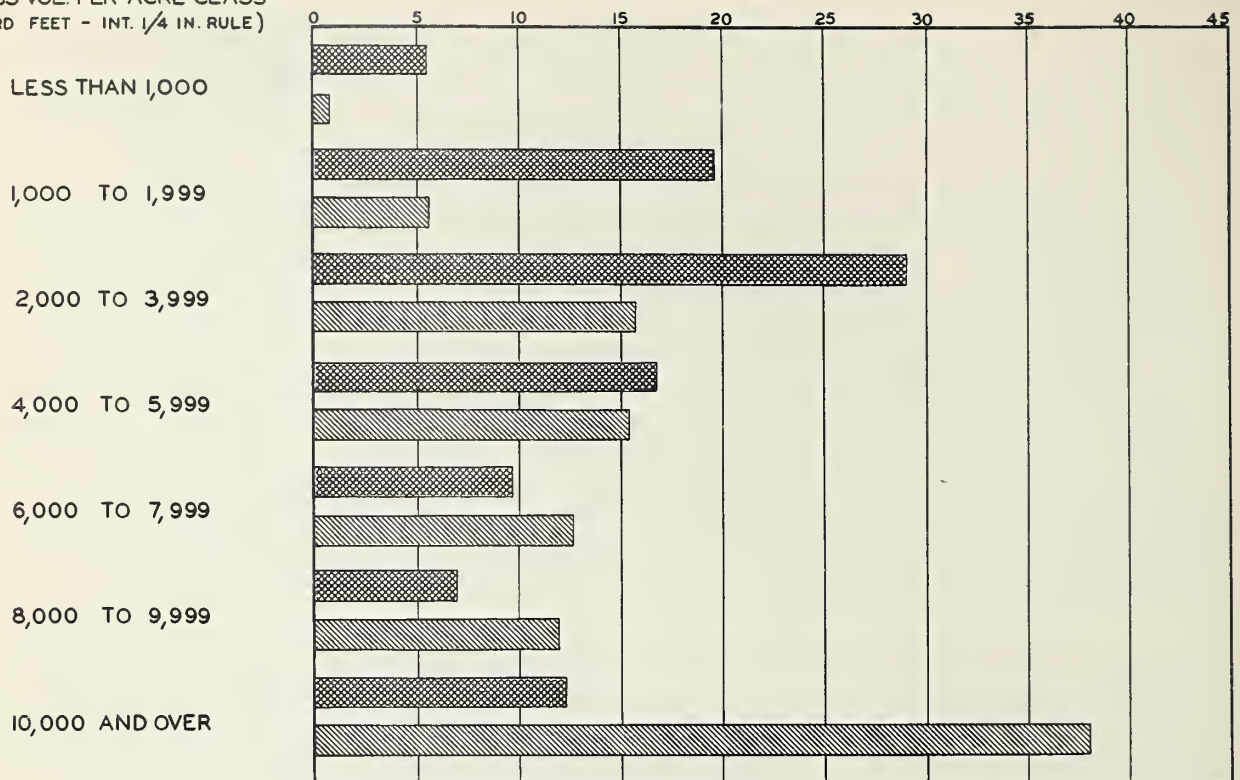
An analysis of stand density based on volume per acre is illustrated in figure 2 for the sawlog-size conditions in both the pine and hardwood type groups. Many lumbermen consider that a stand, to be operable, should have at least 2,000 board feet per acre although areas yielding less than this are often logged if readily accessible. On this basis, three-fourths of the sawtimber area in the pine type carrying 94 percent of the volume would qualify. Twelve percent of the area and 38 percent of the volume occur in stands of 10,000 board feet or more per acre.

In the hardwood type-group over four-fifths of the sawtimber area and 96 percent of the volume is in stands averaging at least 2,000 board feet per acre. Sixteen percent of the area and 41 percent of the volume occur in stands of 10,000 board feet per acre or more.

PINE TYPE GROUP

GROSS VOL.-PER-ACRE CLASS
(BOARD FEET - INT. 1/4 IN. RULE)

P E R C E N T



HARDWOOD TYPE GROUP

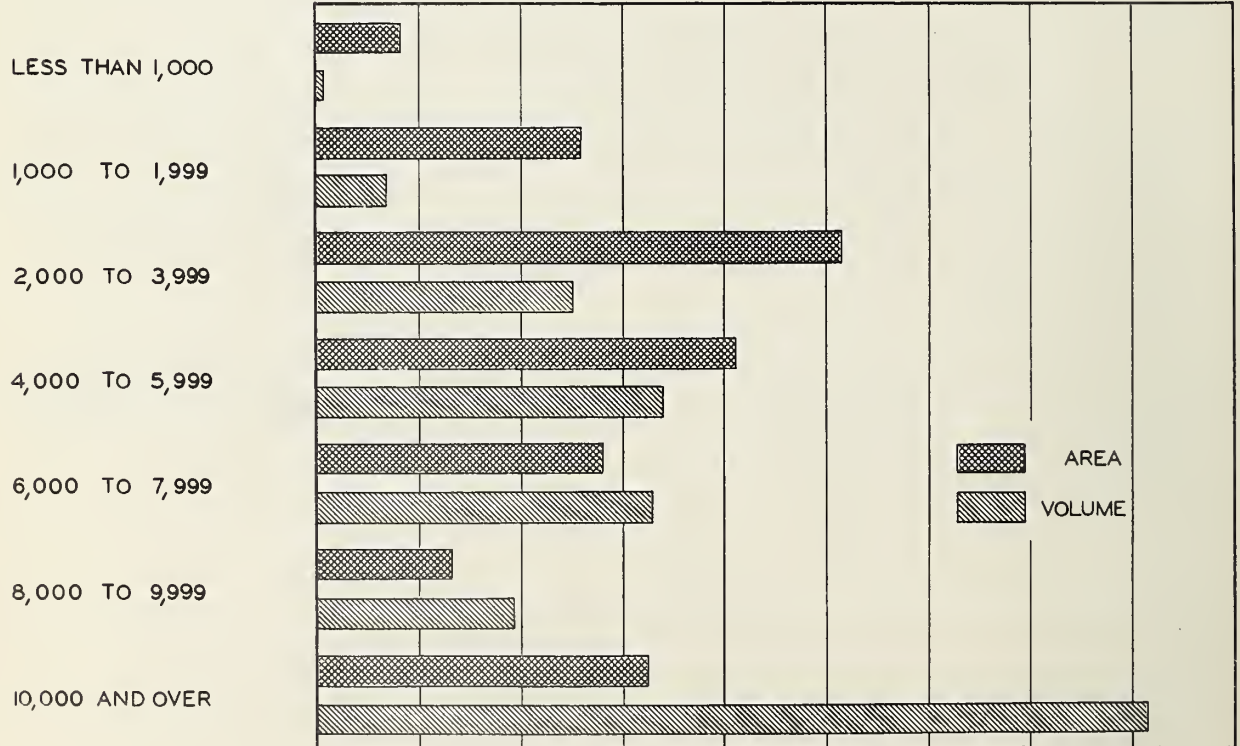


FIGURE 2.— PROPORTIONAL DISTRIBUTION OF AREA AND BOARD-FOOT VOLUME IN THE SAWLOG-SIZE CONDITIONS BY VOLUME-PER-ACRE CLASSES

MILLION BOARD FEET (INTERNATIONAL 1/4 INCH RULE)

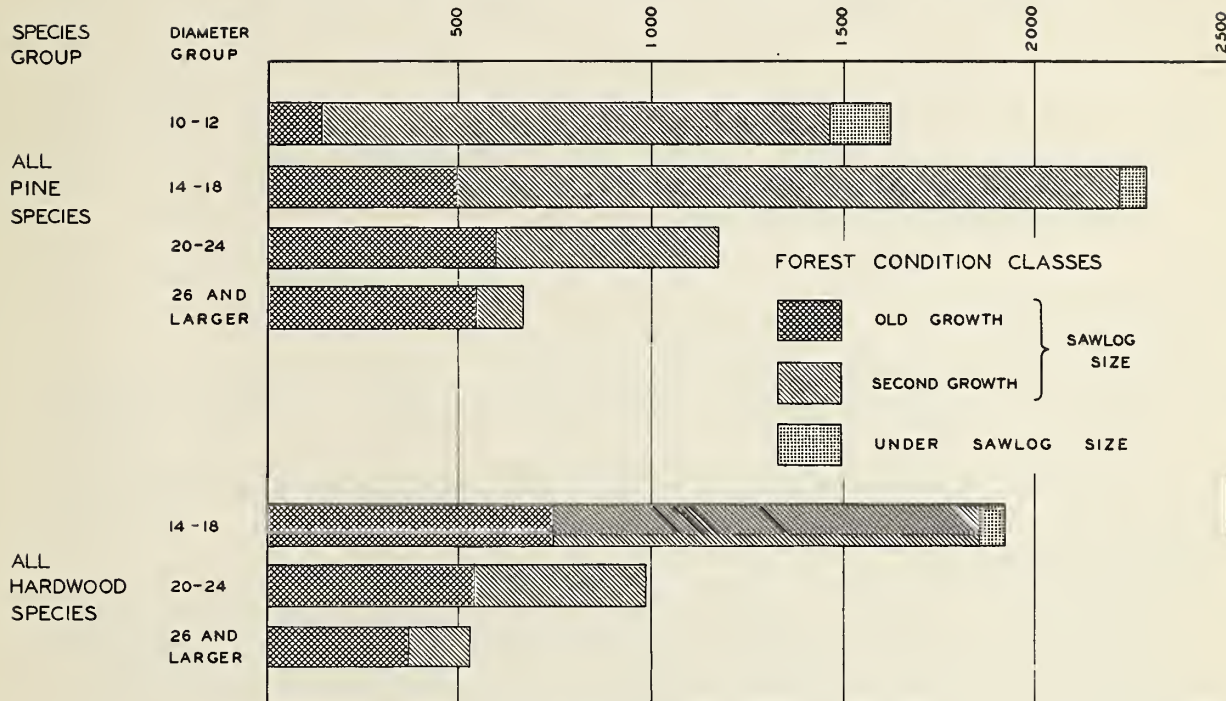


FIGURE 3.—DISTRIBUTION OF NET BOARD-FOOT VOLUME BY DIAMETER GROUP AND FOREST CONDITION

Another index of the merchantability of standing timber is given in figure 3, which shows the distribution of the board foot volume by diameter groups and condition classes for both pine and hardwood species. Nearly 30 percent of the pine volume is in the 10-12 inch diameter group and nearly 70 percent is in trees less than 19.0 inches in diameter.

In hardwoods, in which 13 inches is the minimum size for sawtimber, 55 percent of the volume is in trees in the 14 to 18-inch group and only 15 percent in the group 26 inches or larger.

The average volume per acre of pine and hardwoods is shown in table 5 by type group and condition class. In the old-growth conditions the average volume on the areas partly cut is notably lower than the volume on uncut areas, particularly in the pine type. In second-growth conditions the difference between uncut and partly cut is not as great. The average volume per acre of 3,140 board feet for all forest land is slightly less than the average of 3,300 board feet found in the Northern Coastal Plain unit of the state.

Table 5. - Average net sawtimber volume per acre classified by type group, species group, and forest condition (International $\frac{1}{4}$ -inch rule)

Type group and species group	Forest condition						Average all conditions
	Sawlog size				Average all saw-log size	All under sawlog size	
	Old growth		Second growth				
	Uncut	Partly cut	Uncut	Partly cut			

- - - - - Board feet per acre - - - - -							
Pine types:							
Species group:							
Pine	10,200	4,110	3,710	2,710	4,210	260	2,590
Hardwood	2,860	810	530	520	770	30	470
Total	13,060	4,920	4,240	3,230	4,980	290	3,060
Hardwood types: ^{1/}							
Species group:							
Pine	210	90	250	180	200	30	140
Hardwood ^{2/}	7,780	4,690	4,460	4,130	5,140	210	3,230
Total	7,990	4,780	4,710	4,310	5,340	240	3,370
All types:							
Species group:							
Pine	5,700	2,300	2,910	2,290	3,090	200	1,920
Hardwood ^{2/}	5,080	2,560	1,440	1,120	1,990	80	1,220
Total	10,780	4,860	4,350	3,410	5,080	280	3,140

^{1/}Includes cypress type.

^{2/}Includes cypress volume.

Cordwood Volume

With the rapid growth of the pulp and paper industry on the eastern seaboard in the last three years, timber of a size and quality suitable for pulpwood has found a greatly expanded market. Although none of the new mills have been established in this unit, the mills at Charleston and Savannah undoubtedly will affect timber marketing at least in the eastern counties of the unit, particularly since pulp companies own extensive areas of timber in these counties. Keener competition may be expected among the major forest industries for their future supplies of pulpwood, sawlogs, and unworked turpentine pines. Table 6 is, therefore, of particular value as

it shows the sound volume of all living trees 5.0 inches in diameter and larger, expressed in standard cords including bark. Cull deductions have been made only for those defects which would cause rejection of the material for cordwood.

Table 6. - Net cordwood volume (including bark) of all material classified by species group and source, 1934

Species group	Source of material				Total	Proportion of total
	Sawlog material	Tops of sawlog size trees ^{1/}	Under sawlog size trees	Cull trees		
----- Cords ----- Percent						
Pines:						
Loblolly	8,113,100	1,291,400	1,412,900	72,100	10,889,500	23.1
Longleaf ^{2/} :						
Round	1,926,700	413,500	1,609,000	13,600	3,962,800	8.4
Worked	1,188,800	475,000	404,800	19,500	2,088,100	4.5
Others	1,634,500	411,300	614,300	39,900	2,700,000	5.7
Total	12,863,100	2,591,200	4,041,000	145,100	19,640,400	41.7
Hardwoods:						
Red gum	2,191,900	1,246,500	1,668,300	438,600	5,545,300	11.8
Black and tupelo gum	2,629,500	1,252,200	4,014,100	1,106,500	9,002,300	19.1
Other pulping hardwoods	919,100	480,100	1,059,400	671,300	3,129,900	6.6
Oaks	1,500,400	871,500	1,526,200	1,214,300	5,112,400	10.8
Other nonpulping hardwoods	594,000	335,700	1,143,200	375,500	2,448,400	5.2
Total	7,834,900	4,186,000	9,411,200	3,806,200	25,238,300	53.5
Cypress	1,228,200	385,000	464,300	173,400	2,250,900	4.8
Total all species	21,926,200	7,162,200	13,916,500	4,124,700	47,129,600	100.0
Percent of total	46.5	15.2	29.5	8.8	100.0	

^{1/}Includes the usable portion of the upper stems of pines and of the upper stems and limbs of hardwoods and cypress to a minimum diameter limit of 4 inches outside bark.

^{2/}Includes a small quantity of slash pine.

Although hardwoods make up only one-third of the board foot volume, they comprise nearly 54 percent of the total cordwood volume. The cordwood volume more accurately expresses the true relation of hardwoods in the stands as it includes the volume of all trees 5 inches d.b.h. and larger; whereas, the sawtimber volumes include only sound softwood trees 9 inches d.b.h. and hardwoods 13 inches d.b.h. and larger.

The large volume of black and tupelo gum, particularly in under saw-log size and cull trees, is significant because these species are well adapted to the production of pulp, although to date very little gum pulpwood has been cut by the mills drawing on this area.

The sawlog material accounts for 46 percent of the total cordwood volume and the tops of sawlog trees make up an additional 15 percent suitable for fuelwood and pulpwood but available only as the trees are cut for sawtimber or other use.

Cubic-foot Volume

Cubic-foot volume is the most accurate measure of the solid wood content of trees and offers the best basis for calculation of growth and drain. The total volume of sound wood in live trees 5.0 inches in diameter and larger is therefore given in table 7 expressed in cubic feet excluding bark.

Table 7. - Net cubic foot volume (inside bark) of all material classified by species group and source, 1934

Species group	Source of material				Total	Proportion of total
	Sawlog-size trees		Under saw- log size trees	Cull trees		
	Sawlog material	Tops ¹ / 				
	<u>Thousand cubic feet</u>					<u>Percent</u>
Pine	991,170	198,380	282,440	10,990	1,482,980	45.2
Hardwood	536,410	262,350	589,660	246,630	1,635,050	49.8
Cypress	92,520	26,930	32,480	12,680	164,610	5.0
Total	1,620,100	487,660	904,580	270,300	3,282,640	100.0
Percent of total	49.3	14.9	27.6	8.2	100.0	

^{1/}Includes the usable portion of the upper stems of pines and of the upper stems and limbs of hardwoods and cypress to a minimum diameter limit of 4 inches outside bark.

Poles and Piles

Since trees suitable for poles and piles bring a premium price, an estimate has been made of the number of pine trees that contain sticks meeting the pole specifications of the American Standards Association. Nearly 16 million such trees were found in the unit at the time of the inventory (table 8). As many of these trees will be cut for lumber and pulpwood the primary value of the table is to indicate the distribution of trees by length of stick and diameter class. Nearly three-fourths of the sticks are in the 20- and 25-foot classes and over half are less than 11 inches in diameter at breast height. Only 12 percent are 35 feet or longer.

Table 8. - Number of pine poles and piles classified
by length and diameter

Diameter class ^{1/}	Length in feet						Total	Proportion of total
	20	25	30	35	40	45+		
<u>Inches</u>	<u>Thousand sticks</u>							<u>Percent</u>
7.0- 8.9	3,542	798	270	--	--	--	4,610	29.3
9.0-10.9	2,357	1,080	668	325	90	--	4,520	28.7
11.0-12.9	1,219	845	727	334	234	--	3,359	21.3
13.0-14.9	457	498	505	270	148	32	1,910	12.1
15.0-16.9	109	241	293	158	77	29	907	5.8
17.0-18.9	3	116	164	102	39	16	440	2.8
Total	7,687	3,578	2,627	1,189	588	77	15,746	100.0
Percent of total	48.8	22.7	16.7	7.6	3.7	0.5	100.0	

^{1/}Diameter $4\frac{1}{2}$ feet above ground, outside bark.

Naval Stores Timber Supply

The territory considered as the field for continuing gum naval stores operations was 1,433,000 acres in 1934, and includes practically all of the longleaf-slash pine type-group area and a fraction of the others. It consists of the forest area that is used, or that may be used, for commercial turpentine operations, together with the included areas of clear-cut land and loblolly and hardwood forest types. The gross area of round timber was 928,200 acres; the working timber area 233,900 acres; and the worked-out and resting areas 270,900 acres. Approximately 51 percent of this area is in rolling uplands; 37 percent is in the flatwoods; and the remaining 12 percent is in swamps, bays, and river bottoms.

On the turpentine area there were about 90 million longleaf and slash pine trees (table 9). Nearly 10 percent of these were round trees, 9 inches d.b.h. and over, available for immediate working, and slightly over 80 percent were round trees less than 9 inches d.b.h., representing a large potential resource. The remainder were being or had been worked for naval stores. More than one and one-half million trees were worked-out and should be harvested for lumber, pulpwood or other products.

Table 9. - Round, working, resting, and worked-out longleaf and slash pine trees by turpentine area history

Turpentine area history	Round trees		Working trees	Resting trees	Worked out trees	Total
	1.0"-8.9"	9" & over				
- - - - - Thousands of trees - - - - -						
Round timber area	39,741	6,681	--	125	10	46,557
Working area:						
Front-faced area	2,907	118	1,100	19	--	4,144
Back-faced area	15,794	177	3,244	790	572	20,577
Resting and worked-						
out area	13,901	1,482	--	2,615	931	18,929
<hr/>						
Total turpentine area	72,343	8,458	4,344	3,549	1,513	90,207
Percent	80.2	9.4	4.8	3.9	1.7	100.0

Disregarding all faces being worked at present, an analysis of the turpentine areas with respect to future operations shows that 38 percent of the entire area was in a well developed stage containing at least 8 future faces per acre or 8 round trees 9 inches and larger. This area aver-

aged 26 possible future faces per acre. Approximately 11 percent of the area was in advanced sapling stands, with a sufficient number of round trees, largely 8 inches, to indicate that the stands will reach the well-developed stage in the next 8 years; 15 percent was in young sapling stands, made up mainly of 2-, 4-, and 6-inch trees that will require about 16 years; and 16 percent was in reproduction and clear-cut stands that will require over 20 years to reach the well-developed stage. The remaining 20 percent was in intermingled non-turpentine areas.

Since the naval stores industry has been active in this Survey unit for more than a century, probably the general practice of working most of the longleaf and slash pines before cutting them will continue. However, the recent weak condition of the naval stores market and the activities of the Naval Stores Conservation Program are tending to decrease operations. Moreover the development of the pulp industry may result in the use of an increasing number of round turpentine pine trees for pulp, thus reducing the available supply for naval stores. If the cut of round trees is not greatly increased, there appears to be an ample supply of longleaf and slash pines in this Survey unit to maintain the naval stores industry at the 1936-37 level.

An additional source of naval stores exists in the seasoned stumps of old-growth longleaf and slash pine trees. No attempt has been made to commercialize this resource in South Carolina although elsewhere in the naval stores region stump wood distillation is an important industry. In 1934 the Survey found that 123,200 acres of forest land in the unit had 6 or more seasoned usable old-growth stumps per acre and of this area 62,800 acres had 14 or more stumps per acre. It is estimated that there were on these areas 451,000 tons of stumps that could be salvaged by blasting. If mechanical stump pullers were used, this volume could be increased about two-thirds.

Forest Increment

Forest increment as used in this report is the net balance after deducting the volume lost through mortality from the gross growth on all sound trees. Growth includes not only the volume accruing annually to merchantable trees but also the volume added by small trees reaching the minimum merchantable sizes during the year. The growth on cull trees and on the tops of sawlog-size hardwoods and cypress is not included.

During 1936 the total gross growth of sawlog material amounted to 487,100,000 board feet (table 13). Deducting the mortality of 166,600,000 board feet leaves a net increment of 320,500,000 board feet. Similarly, the entire growing stock had a gross growth of 128,360,000 cubic feet; mortality amounted to 52,430,000 cubic feet, leaving a net increase of 75,930,000 cubic feet (table 14).

Mortality includes the volumes lost through the death of trees by overcrowding, fire, disease, insect attack, and windthrow. In 1936 these

losses amounted to 41 percent of the gross cubic-foot growth. Part of this loss was due to elimination of the weaker individuals, a natural and unavoidable process of stand development when forests are not under intensive management. A large proportion of the mortality losses, however, is due to unnatural causes, chiefly fire and turpentine. As a direct cause, fire is a major contributing factor to mortality, particularly in the seedling and sapling stages. In older stands fire also leaves a large number of scarred and weakened trees highly susceptible to insect and fungus attack and to windthrow.

Turpentine in the longleaf and slash pine stands causes a considerable direct loss in volume of usable wood, and an indirect loss through retarded growth. Moreover, the chipping of turpentine faces creates a highly inflammable fuel in the gum-soaked faces and open cups and gutters. Fire in these stands usually burns hotter than in the loblolly or round longleaf and slash pine stands and reaches higher toward the tree crown, leaving many "dry faces" and deep fire wounds open to insects and disease. Deep chipping and the practice of working small trees contribute to heavy windfall losses. During 1934 loss of increment from turpentine is estimated at 53 million board feet. Of this loss, increased mortality amounted to 28 million board feet, retarded growth to 19 million board feet and the butt volume lost in turpentine trees to about 6 million board feet.

Table 10. - Average net increment per acre, 1934

Forest condition	Sawlog-size material			All sound material ^{1/}	
	Pines	Hardwoods and cypress	Total	Including bark	Excluding bark
	- - - - - Board feet - - - - -			Cords	Cu.ft.
Sawlog size:					
Old growth:					
Uncut	33	134	167	.46	31.5
Partly cut	Neg.	87	87	.36	23.6
Second growth:					
Uncut	116	54	170	.50	35.4
Partly cut	79	57	136	.33	23.1
Under sawlog size:					
Second growth	37	7	44	.27	18.2
Reproduction and clearcut	4	1	5	.01	.8
Weighted average all conditions	64	43	107	.36	25.1

^{1/}Does not include increment on tops and limbs of hardwoods and cypress.

For comparison with other forest areas, the average net increment per acre is shown in table 10, by forest conditions and broad species groups. The weighted average net increment of 107 board feet per acre, although not so high as that of the Northern Coastal Plain of South Carolina (149 bd. ft.) is nevertheless well above the general average for Coastal Plain survey units farther south.

ECONOMIC ASPECTS

Since colonial days, the forests have played an important part in the economic development of the region. The extensive stands of longleaf and slash pine in the original forests early led to the establishment of a thriving naval stores industry which reached its peak of production in the latter part of the 19th century, followed by a decline to its lowest point about the time of the World War. Since 1920 there has been some recovery but the industry has never regained its dominant position in the unit.

The lumber industry in the unit has had its greatest development since the turn of the century, reaching its peak of production in the boom years of 1923-29 followed by a rapid decline to 1932, the low point of the depression. Subsequent production has tended to follow the general trend of national lumber production.

The recent development of the pulp industry in the South brings an important new element into the forest utilization picture. Although no pulp mills have been constructed in this unit, the new mills at Georgetown and Charleston, South Carolina, and Savannah, Georgia, will draw part of their requirements from this unit and will have an appreciable effect on the forest economy of the region.

During 1935 a survey of the wood-using industries was made to ascertain production for the calendar year 1934, and a similar canvass in 1937 for the years 1935 and 1936. These surveys covered the production of lumber, veneer, and cooperage, pulpwood and piece products, and of both domestic and commercial fuelwood. Because neither of the new pulp mills in Charleston and Savannah was in full operation in 1936, the drain figures include only a small part of their normal drain requirements.

Lumber Industry

A total of 138 sawmills operated in the unit in 1936. Ninety mills, or 65 percent of the total, were small portable type mills cutting less than 10 thousand board feet per 10-hour day; 29 mills cut from 10-19 thousand per day; 9 cut 20-39 thousand and the remaining 10 mills had capacities of 40 thousand board feet or more per day. During 1936 the cut of these mills amounted to 222,500,000 board feet, 31 percent of which was manufactured by the small mills cutting less than 20 thousand board feet per day. Cutting practically all pine, the portable mills generally operated in woodlots and stands too scattered or of too low quality to attract larger mills.



Figure 4

Except for Allendale, Beaufort, and Barnwell counties, where only a few were operating in 1936, the distribution of small mills was fairly uniform (fig. 4).

Miscellaneous Wood-using Industries

Eighteen non-lumber plants scattered in the central and western counties produced veneer, cooperage and miscellaneous items such as shingles, handles, and furniture blanks. Fuelwood, crossties, poles and piles, and fence posts made up a substantial part of the total wood volume produced in the unit. The production of fuelwood alone, generally a non-commercial activity, accounted for nearly 573,000 cords of wood, a total volume second only to that used by the lumber industry. Nearly three-fourths of the fuelwood was cut from cull and dead trees, limbs and mill waste and does not constitute a drain on the forest growing stock.

Naval Stores Industry

During the 1936-37 naval stores season there were 428 crops (10,000 cups per crop) in operation and production amounted to 14,180 units (a naval stores unit of one 50-gallon barrel of turpentine and 3-1/3 500-pound barrels of rosin) valued at about \$800,000. A total of 35 stills located chiefly in Hampton, Colleton, Lexington, Aiken and Jasper counties, were active.

Employment

The labor requirements of all forest industries totaled approximately 1,897,000 days (table 11). Thirty-nine percent of the employment was provided by the lumber industry, much of it as part-time work in the small mills. The production of fuelwood required 35 percent. The naval stores industry, including gum producers without stills accounted for 276,000 man-days or 15 percent. The remaining 11 percent, about 213,000 man-days, was required for the production of veneers, crossties, poles, cooperage, fence posts, and a few other miscellaneous products. On the basis of 250 working days of 10 hours each per year, the forest industries would provide regular full-time employment to nearly 7,600 workers. But with a large number of part-time employees, particularly in small sawmills and in fuelwood production, the actual number of workers involved was undoubtedly several times this number.

Table 11. - Production and employment in the primary wood-using industries, 1936

Commodity	Number of plants	Quantity produced	Employment		
			In woods	At plant	Total
- - <u>Thousand man-days</u> - -					
		<u>M bd. ft.</u>			
Lumber	138	222,500	286	450	736
Veneer	10	16,500	31	64	95
		<u>Pieces</u>			
Poles and piles	--	73 M	16	--	16
Crossties	--	247 M	34	--	34
Fence posts	--	1,013 M	15	--	15
		<u>Cords</u>			
Cooperage	4	13,600	14	17	31
Other commercial uses	4	15,700	15	7	22
Fuelwood	--	572,800	672	--	672
		<u>Units</u>			
Naval stores	35	14,180	259	17	276
Total			1,342	555	1,897

Commodity Drain

Commodity drain is the volume of wood cut for industrial and domestic use from sound living trees. It includes the material cut in the unit and shipped outside for manufacture and the volume lost in waste incidental to logging. It does not include the volume cut from cull trees or the tops of hardwood or cypress.

The total commodity drain for 1936 is shown in table 12 for both the sawlog-size material expressed in board feet and for all material, including sawlog volume, in cubic feet (inside bark). The board-foot volumes include the material cut for all products from the stems of sound trees of sawlog-size. The cubic foot volumes include the material cut for all products from all sound trees 5.0 inches in diameter and larger.

Table 12. - Commodity drain from sound trees, 1936

Commodity	Sawlog-size material			All material ^{1/}			Proportion of total
	Pine	Hard-wood ^{2/}	Total	Pine	Hard-wood ^{2/}	Total	
	Thousand board feet			Thousand cubic feet			Percent
Lumber	151,000	77,100	228,100	29,190	11,630	40,820	66.3
Veneer	1,500	16,300	17,800	260	2,330	2,590	4.2
Cooperage	5,700	400	6,100	980	60	1,040	1.7
Pulpwood	1,900	--	1,900	600	--	600	1.0
Poles and piles	6,900	--	6,900	1,370	--	1,370	2.2
Crossties	6,800	4,100	10,900	1,580	660	2,240	3.6
Fuelwood	26,300	28,000	54,300	6,130	4,030	10,160	16.5
Miscellaneous	3,600	3,700	7,300	1,390	1,370	2,760	4.5
Total	203,700	129,600	333,300	41,500	20,080	61,580	100.0

^{1/}Does not include volume cut from tops of hardwoods and cypress.

^{2/}Includes cypress.

Lumber production accounted for 68 percent of the drain from sawlog-size trees and 66 percent of the total commodity drain. Although only one-fourth of the total fuelwood consumed was considered as drain, fuelwood was the next largest in volume, comprising 16 percent of the drain from sawlog-size trees and 17 percent of the drain from all trees. Approximately two-thirds of the total commodity drain is pine. Cypress, included with hardwoods in the tables, makes up only 5 percent of the board-foot drain.

COMPARISON BETWEEN INCREMENT AND COMMODITY DRAIN

The net change in the amount of growing stock between January 1, 1936, and January 1, 1937, and the factors responsible for it are summarized in tables 13 and 14. These tables disclose the magnitude and final effect of the elements of growth, mortality, and drain during 1936.

Table 13. - Comparison between increment and commodity drain, sawtimber material

	Pine	Hardwood and cypress	Total
- - - - Thousand board feet - - - -			
Growing stock, January 1, 1936	5,816,500	3,664,100	9,480,600
Growth	317,600	169,500	487,100
Mortality	-124,900	-41,700	-166,600
Forest increment	192,700	127,800	320,500
Commodity drain	-203,700	-129,600	-333,300
Net change in growing stock, 1936	-11,000	-1,800	-12,800
Growing stock, January 1, 1937	5,805,500	3,662,300	9,467,800

The sawtimber material as a whole was reduced approximately 13 million board feet (table 13). The sawlog-size pine growing stock alone was reduced 11 million board feet, and the volume of hardwood and cypress nearly 2 million board feet.

Table 14. - Comparison between increment and commodity drain,
all material

	Pine	Hardwood and cypress	Total
- - <u>Thousand cubic feet (i.b.)</u> - -			
Growing stock, January 1, 1936	1,474,920	1,290,820	2,765,740
Growth	72,620	55,740	128,360
Mortality	33,190	19,240	52,430
Forest increment	39,430	36,500	75,930
Commodity drain	41,500	20,080	61,580 .
Net change in growing stock, 1936	-2,070	+16,420	+14,350
Growing stock, January 1, 1937	1,472,850	1,307,240	2,780,090

In table 14 a similar analysis of all growing stock, sawtimber and cordwood material combined, presents a more favorable balance. Expressed in cubic-foot measure, there was a 14 million foot increase in the total inventory although the pine volume was reduced by more than 2 million cubic feet. The margin of excess drain in sawtimber and the surplus growth in cubic-foot material is too small to be conclusive evidence of positive trends either toward an increased growing stock or an overcutting of the sawtimber stands. The body of timber has been so reduced in acreage and in volume from that of the original stands that in their present condition almost any major economic change will shift the balance toward increased growing stock or a reduction in the inventory. This is brought out in table 15, which shows the total inventory annually from January 1, 1934, to January 1, 1937.

Table 15. - Changes in the growing stock

Date	Sawtimber material				All growing stock material
	Species-group			Total	
	Pines	Hardwood	Cypress		
	- - - - - <u>Thousand board feet</u> - - - - -				<u>Thousand cu.ft.(i.b.)</u>
January 1, 1934	5,769,100	3,155,400	490,800	9,415,300	2,723,450
January 1, 1935	5,798,400	3,161,400	486,800	9,446,600	2,747,630
January 1, 1936	5,816,500	3,187,600	476,500	9,480,600	2,765,740
January 1, 1937	5,805,500	3,192,100	470,200	9,467,800	2,780,090

During this three-year period, the cubic foot growing stock increased steadily through the post-depression years, including the minor peak year of 1936. The sawlog inventory also increased during 1934 and 1935, but dropped off during the industrially active year 1936. Although no accurate data are now available to continue the record through 1937 and 1938, general indications are that industrial activity slackened, particularly in 1938. To offset the effect of the retarded activity among established wood-using industries, a new permanent market was opened late in 1936 with the construction of the two new pulp mills in nearby Charleston and Savannah. The effect these mills will have on forest conditions is not yet known but it is significant to note that if one-third of their combined capacity requirements had been drawn from the sound pine trees of this unit in 1936, the commodity drain would have been increased approximately 25 percent. Instead of a 2 million cubic-foot deficit, as shown in table 14, there would have been a reduction in the pine growing stock of nearly 13 million cubic feet.

SUMMARY

The southern Coastal Plain of South Carolina is particularly well suited to the production of forest products and there are many good reasons to believe that the business of growing timber for wood products and naval stores will become increasingly important in the Coastal Plain of South Carolina. More than half of the total land area is forested with commercially valuable, rapidly growing pine and hardwood species. The market for forest products is diversified and expanding, and both land and water transportation facilities are readily available. The labor supply is adequate. Finally, there is a distinctly encouraging and helpful attitude on the part of public agencies, private corporations, and individuals toward the development and protection of the forest resources.

Considering the long period of timber exploitation, land clearing and repeated burning, the extent and generally good condition of the timber stands today are excellent criteria of the ability of the area to sustain timber growth. There appears to be little demand for new cropland, and the large acreage of abandoned agricultural land found in 1934 indicates that the area in forest will gradually increase as reproduction becomes established. At the time of the survey, 60 percent of the forest area was classified in the sawlog-size condition -- largely second growth. Stands of 2,000 board feet or more per acre, which usually may be considered operable, occur on 46 percent of the forest area. Clear cut areas where little or no stocking exists amount to less than one percent of the total forest area, one of the lowest ratios of any Survey unit in the South.

These conditions are encouraging. They form the physical basis upon which to expand and intensify the efforts of forest-minded individuals and agencies whose work is already beginning to show beneficial results. The principal problem with respect to the forest resources is now one of increasing the yield to a standard compatible with the costs of development and the industrial and social economics concerned.

A number of deficiencies in the present forest stands materially reduce the annual net yield. Although most of the forest area is in the sawlog-size condition, 23 percent (409,100 acres) of the area in this condition class contains stands with less than 2,000 board feet per acre. Many of the stands in both the sawlog-size and under sawlog-size conditions are understocked and contain an excessive number of cull trees and weed species. An extensive area of turpentine timber has been fully exploited for its gum-producing possibilities, and the worked-out trees should be removed to make room for new crops of round timber. Mortality is excessively high. Much of the loss, however, especially that due to fire and poor naval stores practice, can be eliminated.

The comparison of growth and drain for 1936 indicates that the forests cannot continue to support the sawtimber requirements at that rate without depleting the growing stock. This situation may be somewhat alleviated by an increased production of the under sawlog-size material, which is apparently enjoying a steady, although slow, increase. Against this possible relief, however, must be debited the additional drain to come from the operations of the two new pulp mills. Consideration must likewise be given to the fact that lumber production in 1936, although the highest since 1930, nevertheless was below the 1920-1930 average, so that resumption of manufacturing activity comparable to that decade probably would create a serious overdrain on the current inventory.

The Naval Stores situation is favorable for gum naval stores production at the 1936 level but any outlook for the future of the industry is conditional upon the activity of wood-using industries, particularly pulp mills, the degree of acceptance accorded the Naval Stores Conservation Program, world market conditions, the development of central stilling, and the production of naval stores at pulp mills and wood distillation plants.

Considering the resource, its present rate of growth, and the industrial structure dependent upon it, it appears that the present forest stands are slowly losing ground and are likely to continue to do so unless more efficient use is made of the potentialities inherent in the forest soils and tree species.

The forests are fully capable of producing sufficient timber to meet present requirements and to allow for a further industrial expansion. It is a matter of direct concern to the forest industries and timberland owners of this unit to see that a definite policy of sound forest management and efficient wood utilization is accorded widespread acceptance. The foundation of such a policy is adequate fire protection and improved cutting practices designed to build up and maintain the forest in a more productive condition.

In recent years, many constructive programs have been placed in operation by government agencies, industrial interests, and private individuals. The South Carolina Commission of Forestry, in cooperation with the United States Forest Service, is constantly expanding its fire protection areas and aiding county governments and private associations in lowering the annual losses caused by uncontrolled fire. During 1938, about 48 percent of the forest area in this unit was under some form of organized fire protection.

The new pulp mills established on the coast have announced the policy of managing their timberlands with a view toward sustained yield and integrated utilization. Rules have been set up for guidance of contractors cutting pulpwood on both company and private holdings. Other forest owners, particularly lumber companies, estates and naval stores operators, have initiated various forms of timber and land management on their properties. The State Commission of Forestry maintains an active management division to advise timberland owners in reforestation and cutting practices. The Extension Service through the State Extension Forester and the county agents is

actively engaged in teaching the principles of good forest practice to the farm woodlot owners.

These activities are encouraging indications of an increasing realization of the value of good forest practice in developing the forests of the region to a highly productive condition. Much remains to be done, however, to insure a timber production adequate to maintain existing industries and to permit future expansion. The fire control organization must be strengthened and extended to include the 52 percent of the forest area now without protection. Through extension work and public cooperation the private forest land owners must be aided in applying good forest practices on their own holdings. Research is necessary to develop methods of cutting that will insure satisfactory reproduction of desirable species and rapid growth of high quality timber. Utilization studies should be made to determine new markets, particularly for the large volume of cull trees and species at present having little commercial value. Methods of integrated utilization must be developed to permit the use of cull trees, thinnings and tops for such products as fuelwood and pulpwood, reserving the better trees for sawtimber and other high quality products.

Through a concerted attack on these problems by both public and private agencies the productiveness of the forests can be increased to the point where they will contribute the maximum to the social and economic well being of the unit.

G L O S S A R Y

General

Forest survey unit. -- A subdivision of a state containing from 4 to 10 million acres in which forest, topographic and economic conditions are reasonably homogeneous.

Land-use Classes

Productive forest area. -- Forest land capable of producing timber of commercial quality.

Non-productive forest area. -- Forest land that does not have the qualities necessary for the production of commercial timber.

Cropland. -- Land being used for the production of farm or orchard crops, or showing evidence of having been so used during the preceding 5 years, and still in such condition that it can be easily cultivated.

Abandoned cropland. -- Land formerly cultivated or pastured and now showing distinct signs of having been abandoned for such use.

Pasture. -- Cleared or open land under fence, used primarily for grazing.

Forest Type Groups

Longleaf-slash pine. -- Stands in which pines make up more than 25 percent of the sawtimber volume or, in young stands, more than 25 percent of the dominant and co-dominant stems, with longleaf or slash pine predominating. This group includes both the pure longleaf and slash pine types, and the mixed type, longleaf-slash pine-hardwoods.

Loblolly pine. -- Stands in which pines make up more than 25 percent of the sawtimber volume or, in young stands, more than 25 percent of the dominant and co-dominant stems, with loblolly or other non-turpentine pines predominating. This group includes both the pure pine types and the pine-hardwood types. Small areas of pond pine, spruce pine and shortleaf pine types are also included.

Hardwoods-cypress. -- Stands in which hardwoods or hardwoods and cypress make up 75 percent or more of the sawtimber volume or, in young stands, 75 percent or more of the dominant and co-dominant stems.

Forest Conditions

Sawlog Size

Old growth, uncut. -- Areas with stands composed predominantly of trees of sawtimber size having the characteristics of the original, mature timber of the region and containing at least 1,000 board feet per acre of merchantable species in hardwood types, and 600 board feet per acre in pine types -- with less than 10 percent of the volume cut.

Old growth, partly-cut. -- Areas with old growth stands from which 10 percent or more of the volume has been cut, leaving a minimum of 1,000 board feet per acre in the hardwood types, or 600 board feet per acre in the pine types.

Second growth, uncut. -- Areas with stands of second growth having at least 600 board feet per acre in trees of sawlog size, and with less than 10 percent of the sawtimber trees cut.

Second growth, partly-cut. -- Areas with stands of second growth in which 10 percent or more of the sawtimber trees have been cut but with the remaining stand containing 600 or more board feet per acre.

Under Sawlog Size

Second growth. -- Areas with young second growth stands in which the volume of timber in trees of sawtimber size is less than 600 board feet per acre with the remainder of the trees under sawtimber size.

Reproduction. -- Areas not qualifying for any of the above conditions but having at least 80 well established and well distributed seedlings and sprouts of commercial species per acre.

Clear-cut. -- Cut-over areas having insufficient young growth to qualify for second-growth or reproduction conditions.

Turpentine Area Classification

Round timber area. -- Areas made up almost entirely of unturpented long-leaf and slash pine stands, ranging from reproduction to old growth.

Working area. -- Areas on which trees are being chipped. May be further classified as front-faced if the trees are cupped for their first set of faces, or back-faced if a significant portion has a second set of faces.

Resting area. -- Areas which have been worked in the past and which exhibit sufficient opportunities for a second set of faces on worked trees and for a first set of faces on round trees to justify further operations.

Worked-out area. -- Areas on which the turpentine possibilities have been exhausted and which must await the growth of an adequate number of round trees before working can be resumed.

Diameters

D.b.h. -- Diameter breast high. The diameter outside the bark of a tree measured at a point $4\frac{1}{2}$ feet above the ground.

Diameter classes. -- All trees were recorded in 2-inch diameter classes, that is, trees measuring 5.0 to 6.9 inches d.b.h. are in the 6-inch diameter class.

Tree Classification

Sawlog-size tree. -- A pine or cypress tree at least 9.0 inches d.b.h., or a hardwood tree at least 13.0 inches d.b.h., with not less than one sound butt log 12 feet long, or with 50 percent of the gross volume of the tree in sound sawtimber.

Under sawlog-size tree. -- A sound pine or cypress tree measuring 5.0 to 8.9 inches d.b.h., a sound hardwood tree measuring 5.0 to 12.9 inches d.b.h.

Cull tree. -- Any tree which, because of form, limbiness, rot, or other defect fails to qualify as a sawlog or under-sawlog-size tree.

Pole or pile tree. -- A pine tree from which a pole or pile could be cut conforming in general to the pole specifications set up by the American Standards Association.

Round tree. -- A longleaf or slash pine tree that has not been worked for naval stores.

Working tree. -- Longleaf and slash pine trees that are now being worked for naval stores.

Resting tree. -- Previously worked longleaf and slash pine trees that are now resting prior to the working of back faces.

Worked-out tree. -- Longleaf and slash pine trees on which all possible faces have been worked. These trees have served their purpose in the production of naval stores and are now available for other uses.

Volume Estimates

Cordwood volume. -- This volume (including bark) is derived from the following sources:

1. The sawlog portion of sawtimber trees.
2. That portion of sawtimber trees not usable as sawlogs but acceptable as cordwood. This includes the upper stems of pines, and the upper stems and limbs of hardwoods and cypress to a minimum diameter limit of 4 inches outside bark.
3. The sound under-sawlog-size trees at least 5 inches d.b.h. in which the entire stem is included to a variable top diameter not less than 4 inches outside bark.
4. The estimated sound material in cull trees.

Deductions for cull include only the volume in defects which cause the material to be unsuited for cordwood. Sweep and slight crook are not regarded as defects.

Standard cord. -- A stacked pile of round or split wood bolts measuring 4 x 4 x 8 feet and estimated to contain 90 cubic feet of wood and bark in pine and cypress species, and 80 cubic feet of wood and bark in hardwood species.

Forest Growth

Cubic foot. -- The volume inside bark accruing to all sound trees 5.0 inches d.b.h. and larger, plus the volume in sound trees reaching this specified minimum diameter during the period for which growth is computed.

Board foot. -- The volume accruing to sound pine and cypress trees 9.0 inches d.b.h. and over and hardwood trees 13.0 inches d.b.h. and over, plus the volume in sound trees reaching these respective diameters.

